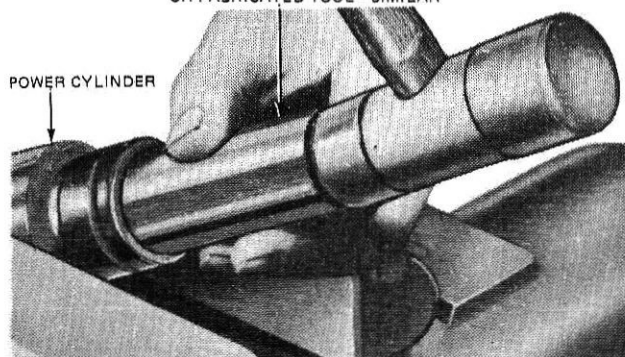


15/16 O.D. x 6 STEEL ELECTRICAL CONDUIT
OR FABRICATED TOOL—SIMILAR



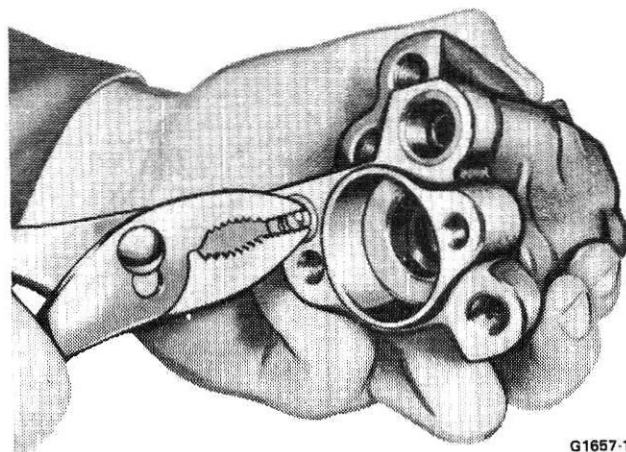
G1662-1B

FIG. 9 Installing Power Cylinder Seals

DISASSEMBLY AND ASSEMBLY CONTROL VALVE

Disassembly

1. Remove the control valve as described in this Part and wipe all loose dirt and fluid from the outside.
2. Remove the control valve spring cap and spring cap gasket from the valve housing (Fig. 2). **For disassembly, use a soft-jawed vise and clamp the valve around the sleeve flange to prevent damage to the housing, spool, or sleeve.**
3. Remove the centering spring adjusting nut from the end of the control valve spool bolt. Remove the two washers, two spring seats, the spacer, and the centering spring, from the spool bolt. Remove the adapter plate.
4. Remove the two bolts that hold the control valve housing and valve sleeve together. Slide the valve housing from the sleeve.
5. Use a finger to push the valve spool toward the **spring cap end** of the housing and remove the seal and bushing.
6. Push the valve spool from the spring cap end of the housing to the sleeve end, forcing the other seal and bushing, plus the spacer, cushion, and washer to fall out. Remove the control valve spool. **Note the direction the spool is removed from the valve housing as it must be assembled in the same direction.**
7. Remove the spring plug and O-ring from the actuator end of the control valve housing with pliers. Remove the washer and spring from the same hole.
8. Invert the valve housing and repeat Step 7.
9. Remove the reaction limiting valve (Fig. 10).
10. Remove the control valve sleeve-to-control valve housing gasket from the housing end of the control valve sleeve.
11. Remove the two dust shield clamp screws, and remove the dust shield. Inspect the shield for damage in the garter spring area (Fig. 11).
12. Tilt the ball stud toward the clamp end of the sleeve. Pull the control valve spool bolt as far out as possible; the stop-pin will fall out or can easily be pushed out with a cotter pin (Fig. 12). (Remove grease to locate stop-pin, if necessary.)



G1657-1A

FIG. 10 Removing Reaction Valve

13. Unscrew the travel regulator on the flats with the proper wrench and lay the regulator and the control valve spool bolt aside.
14. Slide the ball stud toward the clamp end as far as possible to move the ball stud socket to that end of the valve sleeve (Fig. 13, Step A). Remove the ball stud by moving it toward the housing end and pulling it straight out (Fig. 13, Step B). Remove the ball stud socket, the bumper, the bumper spring, and the two ball stud seats.

Assembly

1. Coat all parts of the control valve, except the seals with ATF fluid (C1AZ-19582-A, C, D or equivalent). Coat the seals with COAZ-19553-A or equivalent.
2. Install the reaction valve, two washers, the two springs, and the two spring plug and O-ring assemblies. **Inspect the O-rings for damage and replace, if necessary. Make sure the reaction valve cavity is free of dirt.**

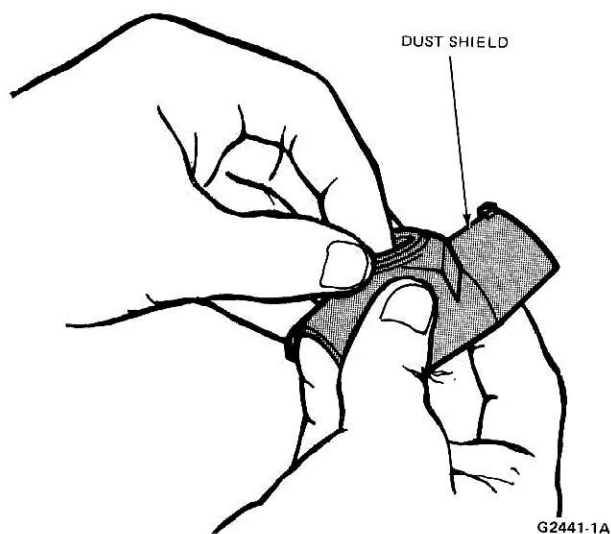


FIG. 11 Inspecting Dust Shield

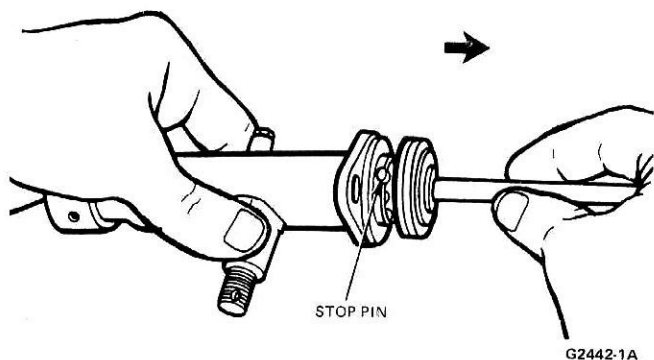


FIG. 12 Removing Stop Pin

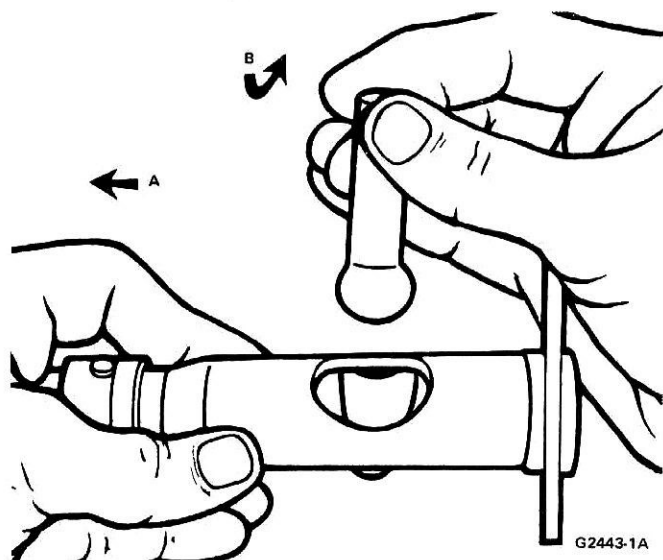


FIG. 13 Removing Ball Stud

3. Insert one of the ball stud seats, flat end first, into the ball stud socket (Fig. 14). Place the ball stud socket into the control valve sleeve as far as possible with the threaded end towards the flange.

Insert the ball stud through the openings in the valve sleeve and the ball stud socket (Fig. 14). Pull the socket out as far as possible and hold it on the socket at the ball stud opening (Fig. 10). Insert the remaining seat, round side toward stud. Install the bumper and the bumper spring. Assemble the travel regulator and spool bolt. Install cushion and washer onto regulator and thread regulator into ball stud socket. Using the proper wrench on the flats of the regulator, torque the travel regulator to 5-10 ft-lb. Then loosen the regulator until the nearest hole is aligned with the slots, at least 1/2 a hole but no more than 1-1/2 hole. Insert the pin. It may be necessary to rotate spool bolt to allow slot in head to align with pin. Tilt the ball stud toward the housing end to retain the pin. Place nut onto stud to protect threads. Using an in-lb torque wrench, measure the torque required to rotate the ball stud. If rotational torque exceeds 35 in-lb, verify proper assembly and adjustment. It may be necessary to loosen the regulator to the 1-1/2 hole location. Lay assembly aside.

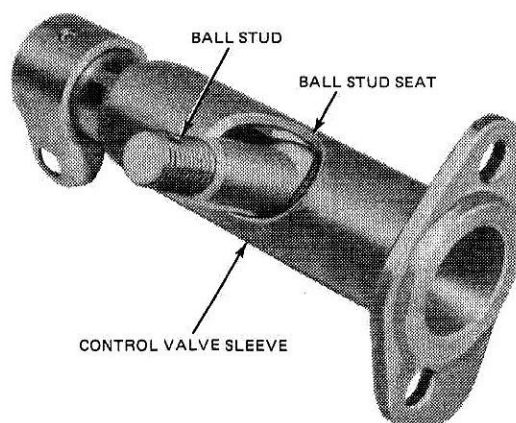


FIG. 14 Installing Ball Socket, Seal and Bracket

4. Install the spool seal, seal bushing, washer, cushion and spacer into the sleeve end of the housing and place on a flat surface. Carefully rotate the spool into the housing (with the large groove nearest the cap end, Fig. 15) until contact with the spool seal is felt. Pick up the housing and press on the cushion at the sleeve end while rotating the spool through the seal. Position the spool so it just protrudes through the seal bushing and install the seal over the spool at the cap end. Place the sleeve end on a flat surface. Using a small blunt screwdriver, work the seal into the housing. Do not scratch the spool, seal, or housing. Install the seal bushing.
5. Install the gasket on the sleeve assembly and attach to the housing. Torque the bolts to 12-19 ft-lb.
6. Move the ball stud laterally to see if it moves freely for about 0.20 inches.
7. Assemble the washer, spacer, adapter, spring seat, control valve centering spring, the other spring seat and washer, and the control valve spool bolt nut.

Torque nut to 90-100 in-lb, then loosen the nut with respect to the spool bolt 1/4 turn (Fig. 16). The ball stud socket will turn first. The 1/4 turn applies after the stud has hit the sleeve window and the spool bolt has turned to its stop.

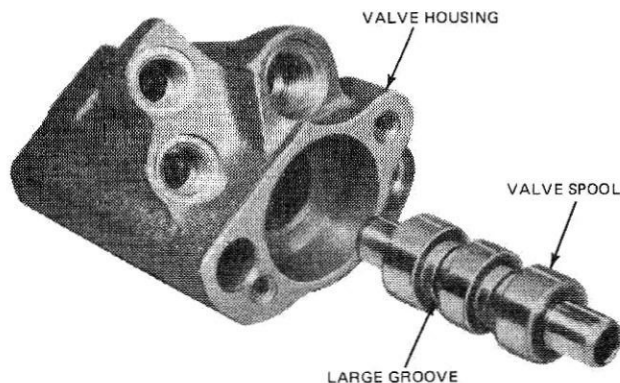


FIG. 15 Inserting Valve Spool

G1659-1B

8. While holding the adapter plate to the housing, move the stud back and forth to check freedom of travel (Fig. 17).
9. Lubricate and install the spring cap gasket and the spring cap. Torque the screws to 72-100 in-lb.
10. Install the boot and clamp over the stud. Make sure the boot garter spring is attached. Loosely assemble the screws. Move the stud sideways to determine the center position and hold there. Position the clamp against the grease fitting. Tighten the screws until the clamp is secure.
11. Remove the grease plug and grease unit with .35-.55 oz. of lube ESA-M1C47-A or equivalent (Fig. 17). Do not fill beyond specification.

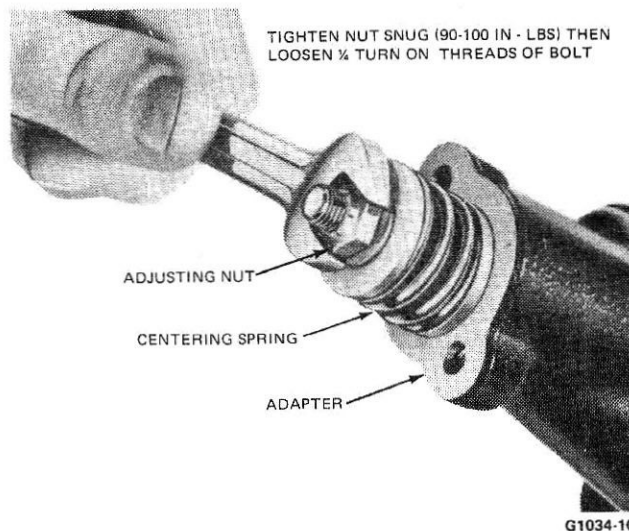


FIG. 16 Adjusting Centering Spring

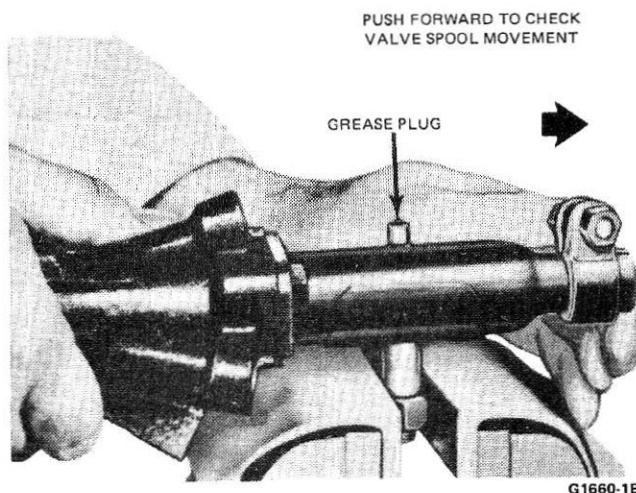


FIG. 17 Inspecting Valve Spool Movement

SPECIFICATIONS

POWER ASSIST STEERING GEAR SPECIFICATIONS

Description	Granada/Monarch, Versailles
Model	SMA-Y
Gear Ratio	16:1
Turns of Strg. Gr. (Lock to Lock) ①	4
Lube Type	*ESW-M1C87-A
Lube Capacity (Lb.)	.70 ± .07
Worm Bearing Preload (In-Lb) ②	2-4
Total Center Meshload (In-Lb) ③	5-7
Adjustment	Adjusting Screw to bottom of sector shaft slot clearance: .000-.004"
Minimum Meshload Over Preload (In-Lb)	2
① Gear only — not attached to Pitman Arm ② Torque required to rotate input shaft at approximately 1½ turns either side of center (gear out of vehicle or Pitman arm disconnected). ③ Required to rotate input shaft and worm assembly past the center high point.	

*Steering Gear Grease C3AZ-19578-A or equivalent.

SPECIAL SERVICE TOOLS

Tool No.	Description
TOOL-3290-C	Tie Rod Ball Ends and Control Valve Ball Stud Remover

POWER ASSIST STEERING GEAR TORQUE LIMITS (FT-LB)

Description	Torque Limit
Sector Shaft Cover Bolts	17-25
Mesh Load Adjusting Screw Lock Nut	32-40
Ball Return Guide Clamp Screw	18-42 (In-Lb)
Preload Adjuster Lock Nut	60-80
Lubricant Fill Plug and Vent	3-9 ①
Valve-to-Cylinder Hose	15-19
Pressure Hose-to-Valve	15-19
Return Hose-to-Valve	16-25
Pressure Hose-to-Insulator Assy. (8-Cyl. Only)	15-19
Hose Clamps	1-2
Pressure Hose-to-Pump (8-Cyl.)	16-25
Centering Spring Adjusting Nut	90-100 (In-Lb)
Spring Cap Attaching Screws	72-100 (In-Lb)
Valve Sleeve Clamp Bolt	13-17
Ball Stud Nut	35-47
Idler Arm Bracket to Side Rail Bolts	50-65
Power Cylinder Rod Attaching Nut	18-24
Worm Screw Hose Clamp	36-47 (In-Lb)

CG1849-2H

Integral Power Steering Gear—Ford

**PART
13-41**

Applies To Ford/Mercury, LTD II, Cougar, Thunderbird, Lincoln Continental, and Continental Mark V

SUBJECT	PAGE	SUBJECT	PAGE
ADJUSTMENTS		DISASSEMBLY AND ASSEMBLY (Cont'd.)	
Mesh Load	41-2	Valve Housing	41-5
Rotary Valve Centering Check	41-2	Worm and Valve Sleeve	41-6
DESCRIPTION		OPERATION	41-1
Steering Gear	41-1	REMOVAL AND INSTALLATION	
DISASSEMBLY AND ASSEMBLY		Steering Gear	41-3
Piston and Ball Nut	41-8	SPECIFICATIONS AND SPECIAL TOOLS	41-9
Steering Gear	41-3		
Steering Gear Housing	41-5		

CG2426-2B

DESCRIPTION

STEERING GEAR

The steering unit (Fig. 1) is a torsion-bar type of hydraulic assisted system. The system furnishes power to reduce the amount of effort required to turn the steering wheel. It also reduces road shock and vibration.

The torsion bar power steering unit includes a worm and one-piece rack piston which is meshed to the gear teeth on the steering sector shaft. The unit also includes a hydraulic rotary valve sleeve assembly, input shaft and torsion bar assembly which are mounted on the end of the worm shaft and operated by the twisting action of the torsion bar.

The torsion-bar type of power steering gear is designed with the one piece rack-piston, worm and sector shaft in one housing and the rotary valve sleeve assembly in an attaching housing (Fig. 1). This makes possible internal fluid passages between the rotary valve sleeve and cylinder, eliminating all external lines and hoses, except the pressure and return hoses between the pump and gear assembly.

The power cylinder is an integral part of the gear housing. The piston is double acting: Fluid pressure may be applied to either side of the piston.

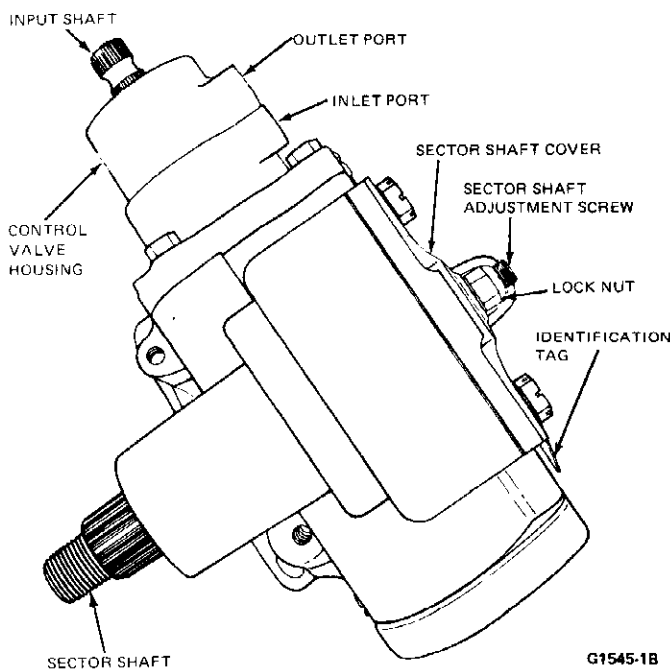


FIG. 1 Ford Integral Power Steering Gear

OPERATION

The control valve is a unique rotary valve sleeve design which uses relative rotational motion of the input shaft and valve sleeve to direct fluid flow. The relative motion is accomplished by deflecting a torsion bar which is attached to the worm with a pin.

In a neutral (straight-ahead) position, where no power assist is required, the valve spool is held in a central position by the torsion bar. The fluid flows from the inlet port through the valve to the outlet port and back to the pump. No area of the steering gear is under high pressure in this position.

The valve, and housing cylinder are always full of power steering fluid, which dampens road shock that

otherwise would be transmitted to the driver through the steering wheel.

When the steering wheel is turned, resistance of the wheels and the weight of the vehicle cause the torsion bar to deflect. This deflection changes the relative position of the valve spool and sleeve ports, directing fluid under pressure to the appropriate end of the piston in the gear housing.

The difference in pressure forces on the piston helps move the sector shaft, thus assisting in the turning effort. The oil in the opposite end of the gear housing is forced out through the return outlet of the control valve and back to the pump reservoir. With higher